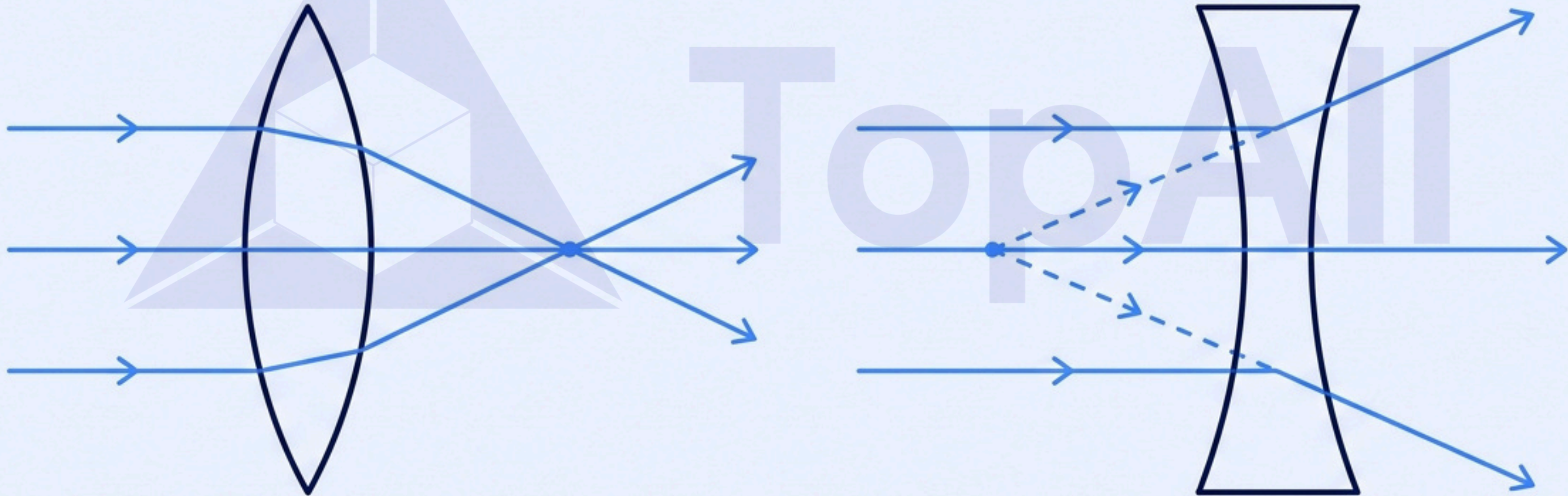


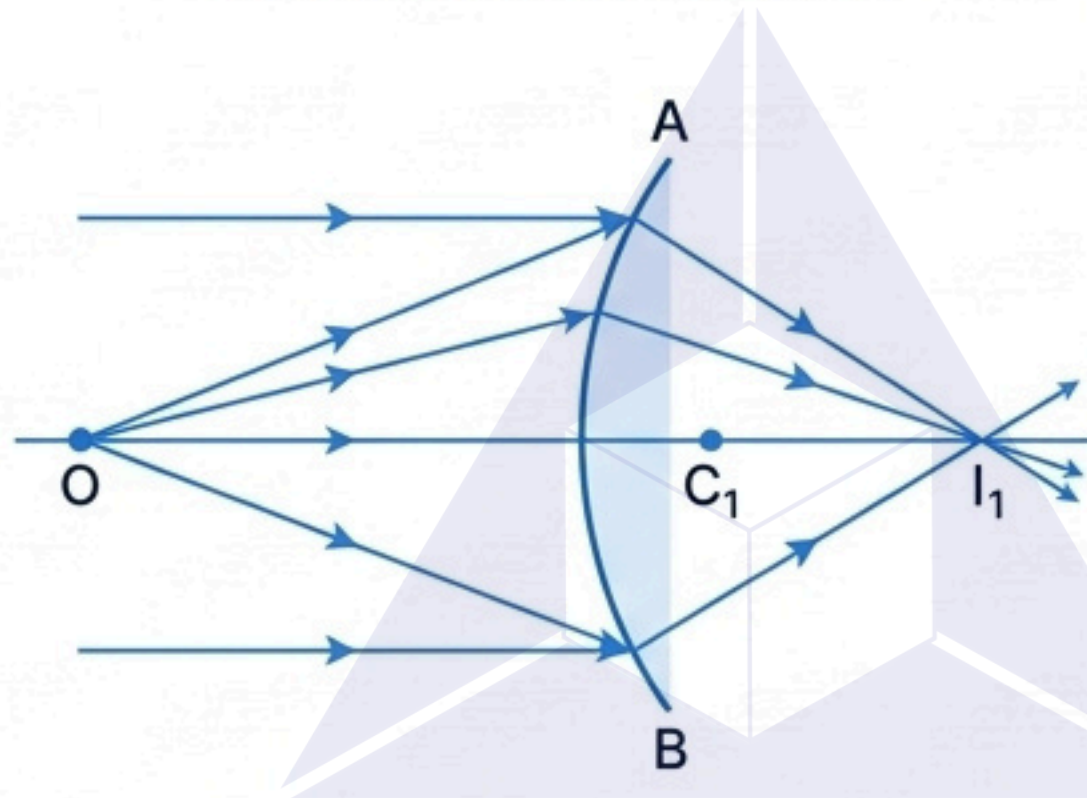
Lens Maker's Formula and Thin Lens Formula

Core Optics Revision | JEE Physics



The Two-Step Refraction Mechanism

The First Interface

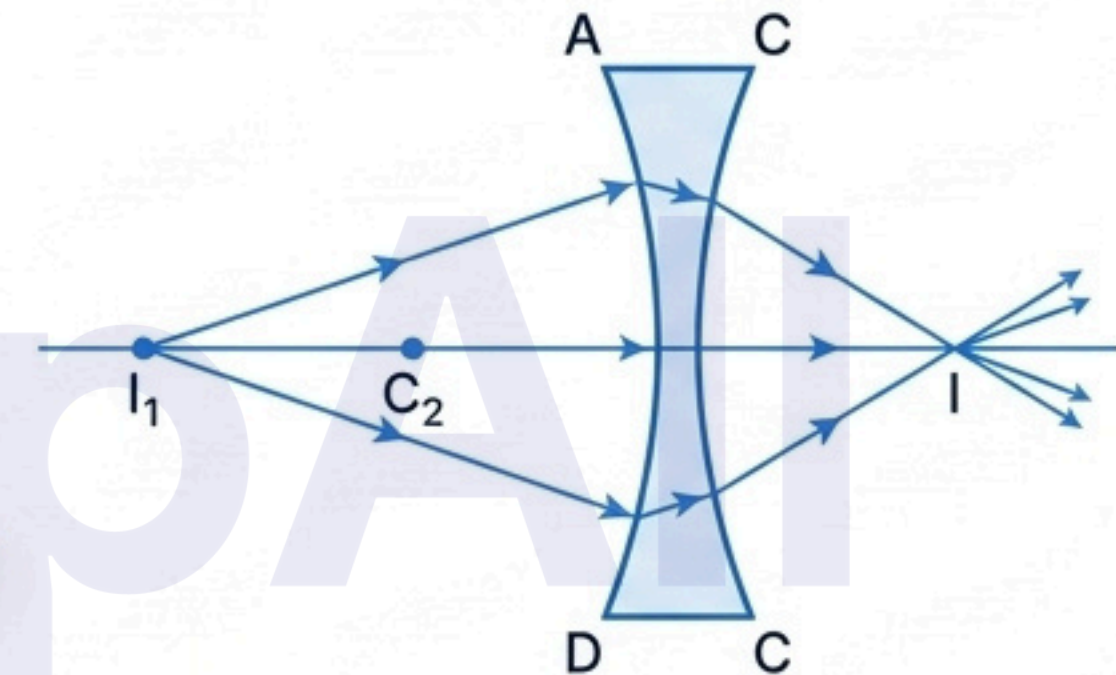


Action: The first refracting surface forms an intermediate image I_1 of the object O .

Status: I_1 acts as a **Virtual Object**.

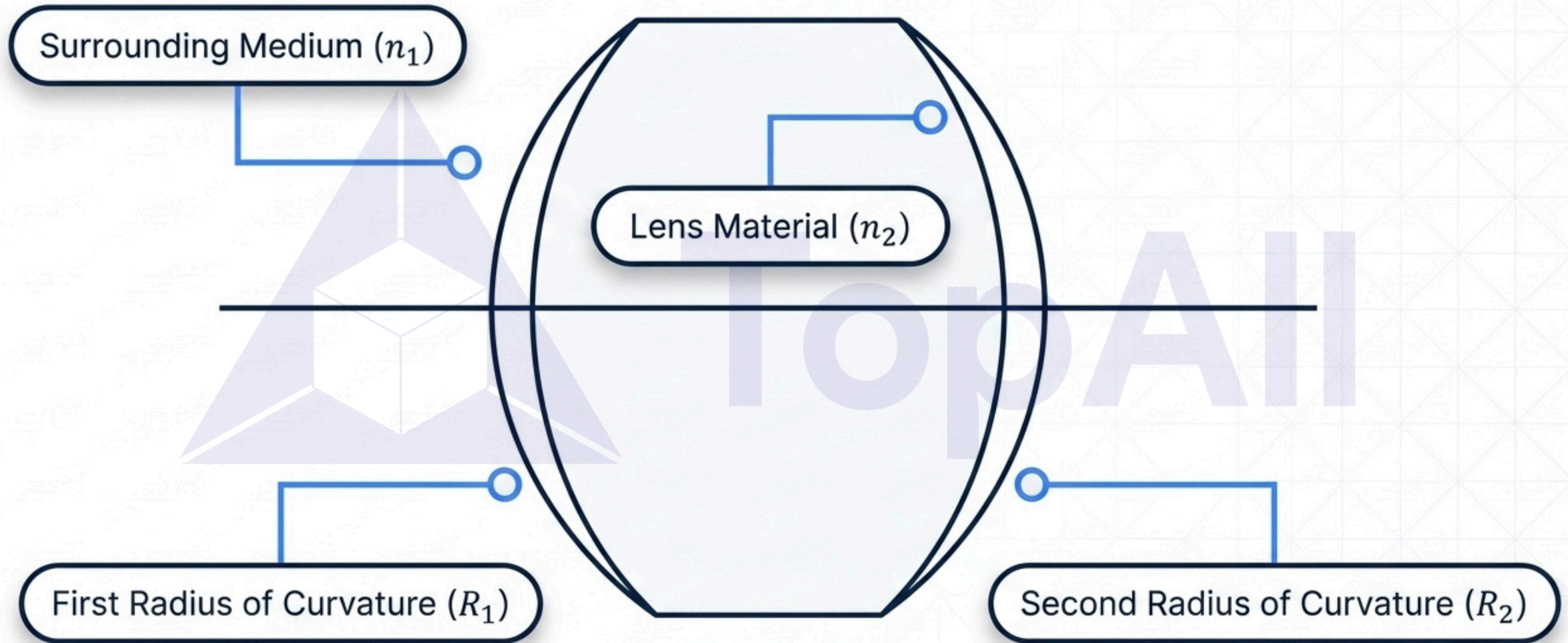
becomes input for

The Second Interface



Action: The second surface refines the virtual object I_1 into the **Final Image I**.

Anatomy of a Spherical Lens



The Lens Maker's Formula mathematically connects these four physical parameters to the resulting focal length (f).



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$$E=mc^2$$



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The Lens Equation Trinity

Lens Maker's Formula

$$\frac{1}{f} = \left(\frac{n_2}{n_1} - 1 \right) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$$

Context: Designs the lens from physical properties.

Thin Lens Formula

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

Context: Finds the image position.

Magnification

$$m = \frac{v}{u}$$

Context: Determines image size and orientation.

JEE Trap Alert: The Sign Flip



Do not mix up your optical formulas!
Lenses use subtraction; mirrors use addition.

Thin Lenses

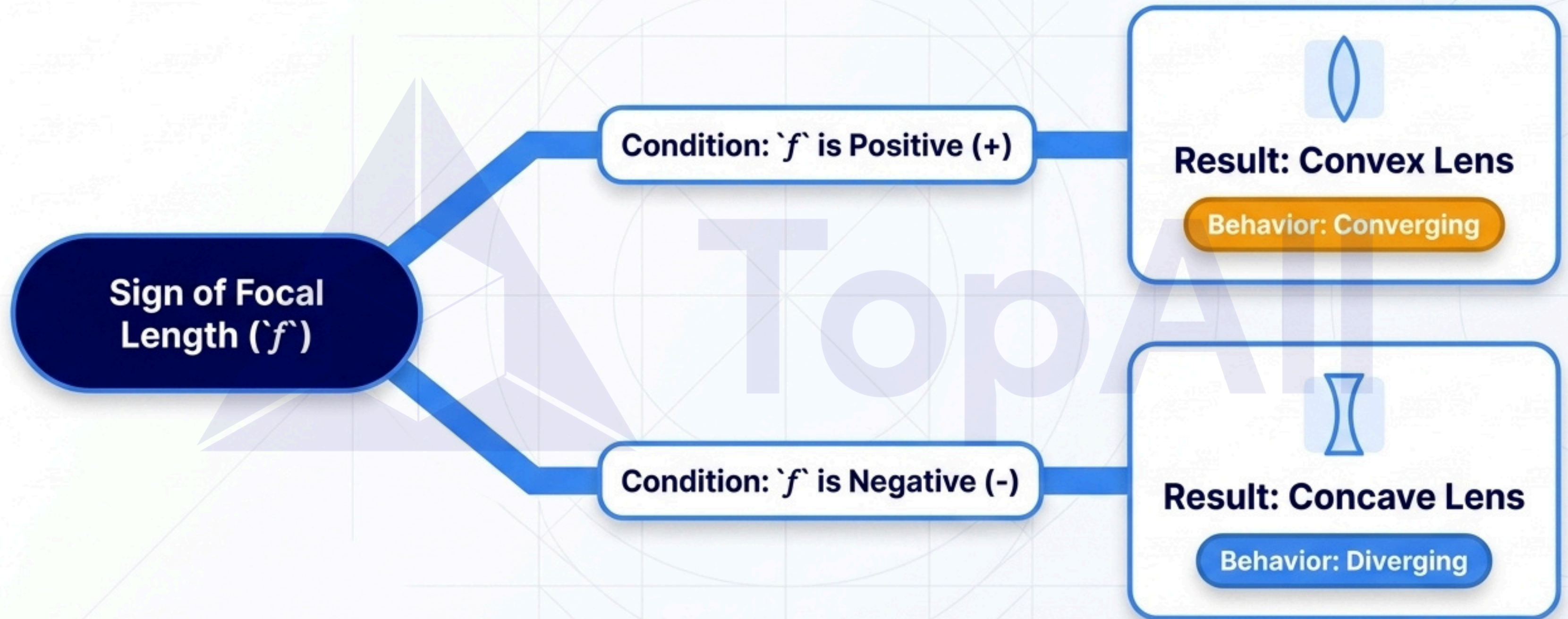
$$\mathbf{1/v - 1/u = 1/f}$$

Spherical Mirrors

$$\mathbf{1/v + 1/u = 1/f}$$

Notice the minus sign! In the heat of the exam, **defaulting to the mirror equation will cost you -1 marks.**

Rapid Diagnostic: Identifying Lens Type



The sign convention mathematically defines the physical behavior of the lens.

Exam Day Mental Anchor

Lens Magnification is simply:

$$m = v/u$$

There is NO extra negative sign (unlike mirrors where $m = -v/u$). Positive m = erect/virtual. Negative m = inverted/real. Lock this in.



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